

(3) For domestic transportation only, in a strong, tight package that prevents leakage of the radioactive content under normal conditions of transport. In addition to the requirements of paragraph (a) of this section, the following requirements must be met:

(i) The shipment must be exclusive use;

(ii) The quantity of Class 7 (radioactive) material in each packaging may not exceed an A<sub>2</sub> quantity;

(4) For domestic transportation only, in a packaging that complies with the provisions of 10 CFR 71.52, and is transported in exclusive use; or

(5) Any Type B, B(U) or B(M) packaging authorized pursuant to § 173.416.

(c) LSA-I and SCO-I (see § 173.403), unless packaged in accordance with paragraph (b) of this section, must be packaged in bulk packagings in accordance with this paragraph. The shipment must be, in addition to complying with the applicable requirements of paragraph (a) of this section, exclusive use:

(1) *Solids*. Packages must be strong tight packagings, meeting the requirements of subpart B of this Part. The requirements of § 173.410 do not apply.

(2) *Liquids*. Liquids must be transported in the following packagings:

(i) Specification 103CW, 111A60W7 (§§ 179.200, 179.201, 179.202 of this subchapter) tank cars. Bottom openings in tanks are prohibited; or

(ii) Specification MC 310, MC 311, MC 312, MC 331 or DOT 412 (§ 178.348 or § 178.337 of this subchapter) cargo tank motor vehicles. Bottom outlets are not authorized. Trailer-on-flat-car service is not authorized.

(d) Except for transportation by aircraft, LSA material and SCO that conform to the provisions specified in 10 CFR 20.2005 are excepted from all requirements of this subchapter pertaining to Class 7 (radioactive) materials when offered for transportation for disposal or recovery. A material which meets the definition of another hazard class is subject to the provisions of this subchapter relating to that hazard class.

(e) LSA and SCO that exceed the packaging limits in this section must be packaged in accordance with 10 CFR part 71.

(f) Tables 8 and 9 are as follows:

TABLE 8.—INDUSTRIAL PACKAGE INTEGRITY REQUIREMENTS FOR LSA MATERIAL AND SCO

Contents	Industrial packaging type	
	Exclusive use shipment	Non-exclusive use shipment
LSA-I:		
Solid .....	IP-1	IP-1
Liquid .....	IP-1	IP-2
LSA-II:		
Solid .....	IP-2	IP-2
Liquid and gas .....	IP-2	IP-3
LSA-III .....	IP-2	IP-3
SCO-I .....	IP-1	IP-1
SCO-II .....	IP-2	IP-2

TABLE 9.—CONVEYANCE ACTIVITY LIMITS FOR LSA MATERIAL AND SCO

Nature of material	Activity limit for conveyances
LSA-I .....	No limit.
LSA-II and LSA-III; noncombustible solids.	No limit.
LSA-II and LSA-III; Combustible solids and all liquids and gases.	100 A <sub>2</sub>
SCO .....	100 A <sub>2</sub>

[Amdt. 173–244, 60 FR 50307, Sept. 28, 1995, as amended by Amdt. 173–244, 61 FR 20752, May 8, 1996]

**§ 173.428 Empty Class 7 (radioactive) materials packaging.**

A packaging which previously contained Class 7 (radioactive) materials and has been emptied of contents as far as practical, is excepted from the shipping paper and certification, marking and labeling requirements of this subchapter, and from requirements of this chapter, provided that—

(a) The packaging meets the requirements of § 173.421(a) (2), (3), and (5) of this subpart;

(b) The packaging is in unimpaired condition and is securely closed so that there will be no leakage of Class 7 (radioactive) material under conditions normally incident to transportation;

(c) Internal contamination does not exceed 100 times the limits in § 173.443(a);

(d) Any labels previously applied in conformance with Subpart E of Part 172 of this subchapter are removed, obliterated, or covered and the “Empty”

label prescribed in § 172.450 of this subchapter is affixed to the packaging; and

(e) The packaging is prepared for shipment as specified in § 173.422.

[Amdt. 173-244, 60 FR 50307, Sept. 28, 1995, as amended by Amdt. 173-244, 61 FR 20752, May 8, 1996]

**§ 173.431 Activity limits for Type A and Type B packages.**

(a) Except for LSA material and SCO, a Type A package may not contain a quantity of Class 7 (radioactive) materials greater than  $A_1$  for special form Class 7 (radioactive) material or  $A_2$  for normal form Class 7 (radioactive) material as listed in § 173.435, or, for Class 7 (radioactive) materials not listed in § 173.435, as determined in accordance with § 173.433.

(b) The limits on activity contained in a Type B, Type B(U), or Type B(M) package are those prescribed in §§ 173.416 and 173.417, or in the applicable approval certificate under §§ 173.471, 173.472 or 173.473.

**§ 173.433 Requirements for determining  $A_1$  and  $A_2$  values for radionuclides and for the listing of radionuclides on shipping papers and labels.**

(a) Values of  $A_1$  and  $A_2$  for individual radionuclides that are the basis for many activity limits elsewhere in this subchapter are given in the table in § 173.435.

(b) For individual radionuclides whose identities are known, but which are not listed in the table in § 173.435, the determination of the values of  $A_1$  and  $A_2$  requires approval from the Associate Administrator for Hazardous Materials Safety except that the values of  $A_1$  and  $A_2$  in Table 10 may be used without obtaining approval from Associate Administrator for Hazardous Materials Safety.

(c) In calculating  $A_1$  and  $A_2$  values for a radionuclide not listed in the table in § 173.435, a single radioactive decay chain in which the radionuclides are present in their naturally-occurring proportions, and in which no daughter nuclide has a half life either longer than 10 days or longer than that of the parent nuclide, will be considered as a single radionuclide, and the activity to be taken into account and the  $A_1$  or  $A_2$

value to be applied will be those corresponding to the parent nuclide of that chain. Otherwise, the parent and daughter nuclides will be considered as a mixture of different nuclides.

(d) Mixtures of radionuclides whose identities and respective activities are known, must conform to the following conditions:

(1) For special form Class 7 (radioactive) material:

$$\sum_i \frac{B(i)}{A_1(i)} \quad \text{less than or equal to 1}$$

Where  $B(i)$  is the activity of radionuclide  $i$  and  $A_1(i)$  is the  $A_1$  value for radionuclide  $i$ ; or

(2) For other forms of Class 7 (radioactive) material, either—

$$\sum_i \frac{B(i)}{A_2(i)} \quad \text{less than or equal to 1}$$

Where  $B(i)$  is the activity of radionuclide  $i$  and  $A_2(i)$  is the  $A_2$  value for radionuclide  $i$ ; or

$$A_2 \text{ for mixture} = \frac{1}{\sum_i \frac{f(i)}{A_2(i)}}$$

where  $f(i)$  is the fraction of activity of nuclide  $i$  in the mixture and  $A_2(i)$  is the appropriate  $A_2$  value for nuclide  $i$ .

(e) When the identity of each nuclide is known but the individual activities of some of the radionuclides are not known, the radionuclides may be grouped and the lowest  $A_1$  or  $A_2$  value, as appropriate, for the radionuclides in each group may be used in applying the formulas in paragraph (d) of this section. Groups may be based on the total alpha activity and the total beta/gamma activity when these are known, using the lowest  $A_1$  or  $A_2$  values for the alpha emitters or beta/gamma emitters, respectively.

(f) *Shipping papers and labeling.* (1) For mixtures of radionuclides, the radionuclides ( $n$ ) that must be shown on shipping papers and labels in accordance with §§ 172.203 and 172.403 of this subchapter, respectively, must be